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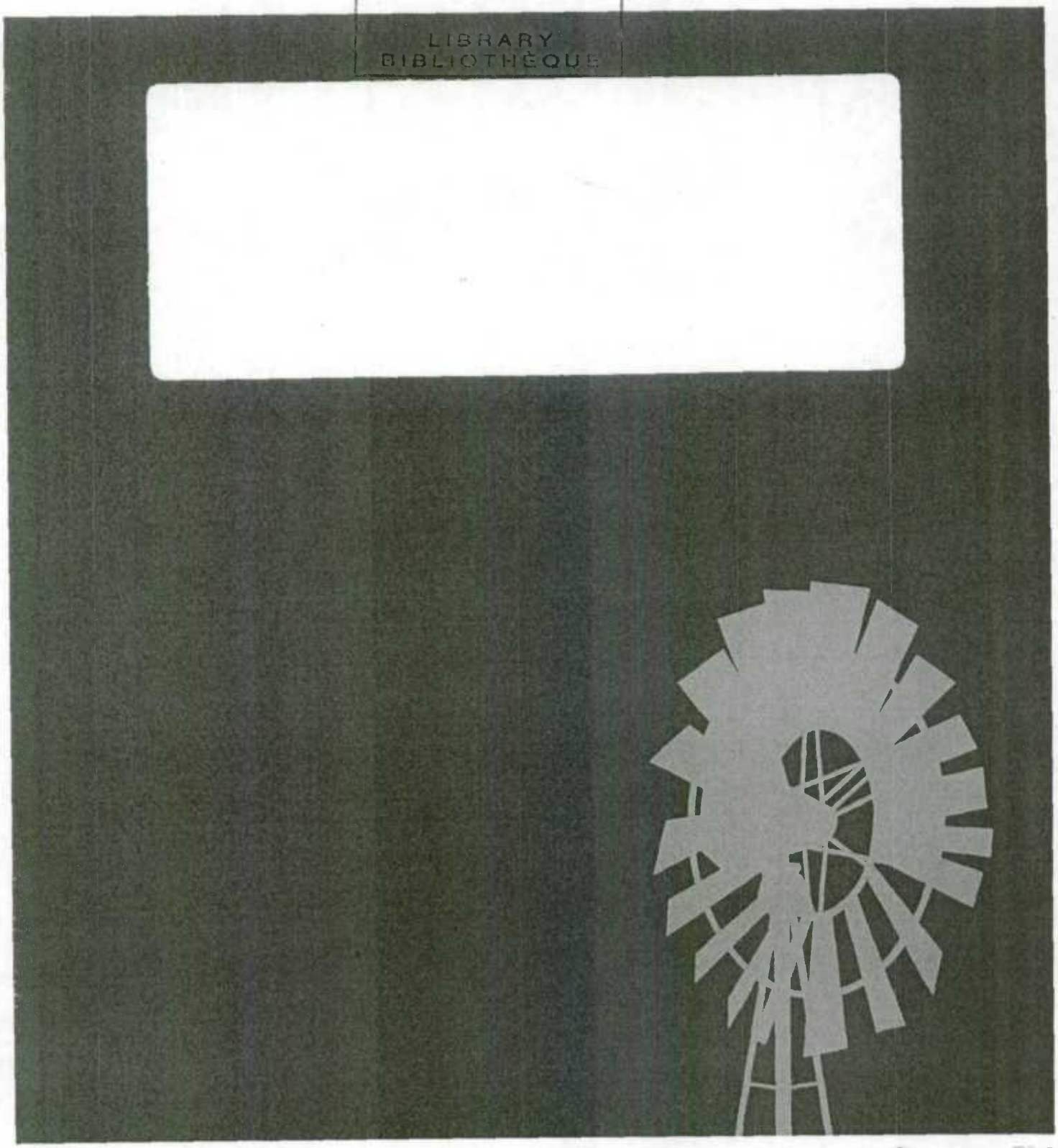

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WORKING PAPER #24

Farm Structure Data:

A U.S.-Canadian Comparative Review

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May 2, 1994

Cat. No.: 21-601-MPE94024

The responsibility for the analysis and interpretation of the data is that of the authors and not of Statistics Canada.

FARM STRUCTURE DATA:

A U.S.-CANADA COMPARATIVE REVIEW

INTRODUCTION

Liberalized trade is expected to affect the agricultural economies of both the United States and Canada. As specialization develops to capture comparative advantages, National governments will want to better understand the structure of their agricultural economies to help anticipate and/or facilitate future structural change. Thus, the availability of accurate, reliable, and timely data on the farm sector has become increasingly important for exploring the changing structure of agriculture in a more global context. At the same time, the oft-quoted "globalization of agricultural trade" also applies to increased "trade" of agricultural data itself and recent years have seen a greater demand for the exchange of comparable farm structure data, particularly between the United States and Canada.

This paper identifies and describes sources of U.S. and Canadian data which are most useful for examining the structural features of National agricultural sectors. The 10 sources reviewed here are National in scope, collected on a regular or periodic basis, and contain data that can be disaggregated into basic classifications of farm structure, such as number and size of farms, farm type based on major commodity, economic sales class, and type of organization (for example, individually-owned, partnership, or corporation)(table 1). In addition, these sources contain various types of data that are useful for understanding and directing research and policy analysis on farm structural adjustment. These data include farm financial performance indicators (such as debts, assets, cash receipts, and net farm income); characteristics of farm operators or landlords (including age, gender, and education); production data (for example, acres harvested, livestock inventories, or production expenses) and farm family or household attributes (such as characteristics of family members and measures of family economic well-being).

The data sources differ widely in terms of agency responsible for data collection, frequency of data collection, availability of longitudinal or repeated cross-section data, and level of greatest geographic detail (table 2). Even among data series purporting to collect similar types of data, estimates may vary due to differences in data collection methods, estimating procedures, definitions, and data reference periods. These variations affect data comparisons within each country as well as between countries.

This paper examines the background, methodology, definitions, and content of each data source and identifies several major points that users should consider when selecting U.S. and Canadian data sets for comparison. In addition, the paper explores issues to help improve future data collection efforts and enhance the comparability of data between the two countries.

SOURCES OF U.S. FARM STRUCTURE DATA

There are five major sources of farm structure data in the United States: the Census of Agriculture, the Census of Agriculture Longitudinal Data File, the Agricultural Economics and Land Ownership Survey, the Farm Costs and Returns Survey, and the June Agricultural Survey.

These U.S. data sources all define a farm as any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the reference year. Also, these sources share a common definition of farm operator as the person who operates a farm, either doing the work or making day-to-day decisions about such things as planting, harvesting, feeding, and marketing. The operator may be the owner, a member of the owner's household, a hired manager, a tenant, a renter, or a sharecropper. All U.S. data sources assign only one operator per farm and do not count or collect information on partners or other household members who help in farm operation. 1/ Readers should consult each individual data source for differences in definitions of major variables.

Census of Agriculture

The Census of Agriculture, conducted by the U.S. Department of Commerce, Bureau of the Census, is the leading source of statistics on agricultural production and provides the only source of data on U.S. agriculture at the county level. The Census has been conducted periodically since 1840, but since 1982 has been conducted every 5 years for years ending in 2 and 7. Data are published at the National, State, and county level (U.S. Department of Commerce 1989) and summary data are also available on computer tapes, compact disks, and public-use computer tapes. Special tabulations can be prepared by the Bureau of the Census for users at costs.

Methodology: The Census of Agriculture collects information on all farms in the United States by use of a mail survey. The mailing list for the 1987 Census consisted of about 4.1 million individuals, businesses, and organizations that had a substantial probability of being a farm operation. This mailing list generated 1.8 million useable questionnaires which after adjusting for nonresponse was expanded up to an estimated 2.1 million farms in the United States. All respondents were asked questions on acreage, crops and livestock produced, market value of sales, land use, irrigation, type of organization, and operator characteristics. The reference period was the year prior to data collection. To reduce the response burden of the Census, a sample of farms was asked additional questions on farm production expenses, market value of land and buildings, machinery and equipment, and income from farm-related sources. This sample generated about 616,000 useable reports.

Types of data collected: The Census collects information on the size, tenure, type of organization, principal occupation and age of operator, market value of agricultural products sold, farm production expenses, farm-related income, and type of farms based on Standard Industrial Classification (SIC) system.

Considerations:

- The Census of Agriculture is the leading source of statistics about U.S. agricultural production and the only source of consistent, comparable data at the county, State, and National levels.

- Since Census data are collected only once every five years, they may not reflect recent changes in the farm sector.

- Census data include financial performance indicators, production data, and operator characteristics, in addition to farm structure variables. However, information on farm households and families is not available.

- Census data count only one operator per farm and, therefore, undercount the number of farm operators.

- Agricultural products produced under contract complicate the collection of production and expense data. Contracting arrangements vary widely but often the contractor and not the farmer makes most of the production decisions. Since data are usually collected from the operator and not the contractor, data collection and estimation are more difficult.

- The Census is the longest running data series reporting information on U.S. farms, dating back to 1840. Changes in definitions over time may affect historical comparability.

Census of Agriculture Longitudinal Data File

Originally designed for administrative use, the Census of Agriculture Longitudinal Data File matches records for individual farms from different Census years. Unique among U.S. data sources, the Longitudinal Data File enables analysis of change in individual operations from the time of a farm's entry, across the years of its continued operation, until its exit. This information is not available from cross-sectional data. The longitudinal data are not published by the Bureau of the Census, but the Bureau will prepare special tabulations for users at cost. See Peterson and Gale (1991) and Gale and Henderson (1991) for examples of data analyses using this file.

Methodology: Each farm in the Census is assigned a Census File Number, a unique identifier which is preserved across census years as long as the same operation remains under management of the same operator. The longitudinal data file links consecutive census years 1978, 1982, and 1987 by matching census records that possess the same Census File Number. In instances when an operation is found not to exist in a particular year, it is carried in the file with zero values for that year's variables. The 1992 Census data will be added to the file when they become available in 1994.

Types of data collected: The data file contains only a limited number of variables from the Census of Agriculture: State and county identifiers, tenure, land in farms, type of organization, total value of product, Standard Industrial Classification, acres irrigated, value of land and buildings, expenses, government payments, and operator characteristics including occupation, age, sex, race, Spanish-origin, and days worked off-farm. Not all variables are available for all years.

Considerations:

- The longitudinal file is unique among U.S. data sources reviewed here because the data track changes in individual farms over time.

- The file is limited to only three years of Census data spanning 1978 to 1987.
- Data include only 17 economic and demographic variables, and not all data are available for all years. The file contains only structural variables and selected operator characteristics.
- Data are not published by the Bureau of the Census; access to the data file is restricted to authorized personnel and data processing must be performed on-site at the Bureau of the Census. However, special tabulations may be obtained from the Census Bureau at cost.
- See other considerations under Census of Agriculture.

Agricultural Economics and Land Ownership Survey

The Agricultural Economics and Land Ownership Survey (AELOS) is an integrated survey of farm finance and land ownership in 1988, conducted by the Bureau of the Census. Beginning in 1960, special surveys were conducted in connection with the Censuses of Agriculture on selected aspects of farm finance. AELOS includes the majority of the financial measures collected in earlier farm finance surveys and greatly expands data on land ownership.

Although scheduled to be conducted again in conjunction with the 1992 Census of Agriculture, budget constraints have raised questions about its continuation. Data are available in published reports and public-use computer tapes from the Bureau of the Census (U.S. Department of Commerce 1990). Special tabulations can be prepared by the Bureau of the Census at cost.

Methodology: AELOS uses a two-stage probability sampling procedure to select farm operators and agricultural landlords. In the first stage, a mail list of farm operators was selected from the 1987 Census of Agriculture and stratified on the basis of State, tenure, and value of total agricultural products sold. Usable information was obtained from about 32,000 farm operators. In the second stage, a mail list of landlords was developed based on all landlords reported by farm operators in the first stage. Landlords are defined as any individual, partnership, or entity controlling land rented, leased, or used rent-free by a farm operating unit. The number of landlords is not a measure of landholders but a count of the number of leases or rental arrangements made by farm operating units. This sample included about 47,000 landlords. Survey data were expanded to estimate totals as if a complete census of operators and landlords had been conducted.

Types of data collected: AELOS provides detailed data on indebtedness, expenditures, income, and assets for both farm operators and landlords. Data also include measures of credit used for purchases and expenditures, taxes, debt by type of lender, and off-farm income. Land ownership data include estimates for acres of agricultural land owned, how it was purchased, type of ownership, and a measure of the number of acres acquired and sold. Data include landholders who operate farms as well as landholders who are not farm operators. Information is published for the United States, 4 regions, 9 divisions, and each of the 50 States. AELOS was conducted in 1989 with 1988 as the reference period.

Considerations:

- AELOS provides detailed financial indicators for U.S. farm operations and is the most comprehensive data source on U.S. landlords.
- The survey is generally conducted in conjunction with the Census of Agriculture but data collection has not been regular or consistent over time.
- Expanded results from AELOS differ from published data from the Census of Agriculture because the AELOS sample selection does not include some 35,000 horticultural specialty farms and 1,700 institutional, research and experimental farms, and Indian reservations. Also, AELOS data do not include new farms or those that had gone out of business since 1987.
- See other considerations under Census of Agriculture.

Farm Costs and Returns Survey

The Farm Costs and Returns Survey (FCRS) is conducted annually by the U.S. Department of Agriculture's National Agricultural Statistical Service (NASS) and the Economic Research Service (ERS). The FCRS is used to help determine farmers' net farm income and monitor the financial condition of U.S. agriculture, determine what it costs to produce various crop and livestock commodities (as mandated by Congress), and help determine the characteristics and financial situation of farm operators and their households.

The FCRS has been conducted since 1985 and some information on farm production expenditures now collected in the FCRS were collected in other surveys from 1955 to 1984. The FCRS data are published in NASS's *Farm Production Expenditures* series and used in ERS's *Economic Indicators of the Farm Sector*

series, as well as in other USDA reports (see U.S. Department of Agriculture 1992 and 1993b; Morehart, et al. 1992).

Methodology: The FCRS is conducted in all States except Alaska and Hawaii. The FCRS's sampling design features multiple frame sampling from list and area frames. A probability sample was drawn from a list of mostly larger, more specialized operations. A second probability sample of small land areas was drawn to account for farms not on the list. The total sample of approximately 24,000 farms selected for personal interviews in 1991 yielded about 12,000 useable questionnaires. Every other year, a Farm Operator Resource (FOR) version of the FCRS collects information on farm household demographics. The FOR does not include an area frame and data are collected from a much smaller sample of farms. See U.S. Department of Agriculture (1990) for additional information on survey design.

Types of data collected: The FCRS collects information on: operated land and land use, operating expenses, labor use, capital expenses, the use of contracts for selling and/or producing agricultural commodities, production and costs of production by commodity, value of sales, farm type, type of organization, operator characteristics, and off-farm income of farm households. Data are reported for the Nation and 10 agricultural production regions.

Considerations:

- The FCRS provides comprehensive data on costs of production and farm financial conditions for U.S. farms on an annual basis. Data are also collected on operator and farm household characteristics.

- The FCRS undercounts U.S. farms. For example, FCRS farms represented about 82 percent of all U.S. farms in 1990. Most of this undercount occurred among farms with sales of less than $10,000. Beginning with the 1991 data, the FCRS will be adjusted to account for this undercount. Data for years prior to 1991 will not be adjusted and therefore may affect historical comparability.

- The FCRS sample size is not large enough to provide statistically reliable estimates for all States.

- The accuracy of production and expense data may be affected by the increased incidence of farms producing commodities under contract where the contractor and not the farmer makes most of the production decisions.

- Agricultural products produced under contract complicate the collection of production and expense data. Contracting arrangements vary widely but often the contractor and not the farmer makes most of the production decisions. Since data are usually collected from the operator and not the contractor, data collection and estimation is more difficult.

June Agricultural Survey

The June Agricultural Survey (JAS) is conducted by the U.S. Department of Agriculture's National Agricultural Statistical Service (NASS). The survey collects information on number and size of farms, crop acres, livestock numbers, and other agricultural information. While the results of the June Agricultural Survey are not published in specific publications, the data provide the basis for the current season's crop production estimates and the foundation for setting estimates of cattle and hog inventory and supplies of grain in storage. The survey is also used to estimate the number of farms and land in farms as reported in NASS's annual report on farm numbers and land in farms (U.S. Department of Agriculture 1993a). NASS has estimated the number of farms since 1910 and land in farms since 1950.

Methodology: The JAS is conducted annually in all States except Hawaii and Alaska. Information collected in the survey refers to the situation as it exists on June 1st. The survey is a multiple-frame survey comprised of a list frame and an area frame. The list frame consists of a list of farms which are classified and sampled by size and type. Operators on the list frame are contacted by either mail, telephone, or face-to-face interviews. The area frame survey, or the June Enumerative Survey, is a probability sample conducted by personal interview. The area frame is used to account for producers not on the list. The entire land area of the United States is divided into small segments generally ranging in size from one-half to three square miles. A random nationwide sample of about 16,000 of these segments are selected to be enumerated. Results of the area frame are used to develop list frames for other USDA surveys.

Types of data collected: The JAS provides State data on the number of farms, the total land in farms, average farm size, and economic sales class.

Considerations:

- The JAS data are used to determine USDA's official estimate of the annual number of farms and land in farms.

- Data include only a limited number of farm structure variables and contain no information on financial performance, operator or household characteristics.

- Estimates are based on the situation on June 1, which may not represent conditions during other times of the year.

- The JAS is the longest running annual data series on the number of farms, reporting data since 1910.

SOURCES OF CANADIAN FARM STRUCTURE DATA

There are five major sources of farm structure data in Canada: the Census of Agriculture, the Agriculture-Population Linkage Database, the 1966-1991 Census of Agriculture Match, the Farm Financial Survey, and the Whole Farm Data Base.

All of these sources, with the exception of the Farm Financial Survey, use a common definition of Census-farm which refers to a farm, ranch, or other agricultural holding producing agricultural products intended for sale. The earlier 1981 and 1986 censuses defined a census farm as any farm, ranch, or other agricultural holding with sales or anticipated sales of agricultural products of $250 or more during the past year. In practice, the 1981, 1986, and 1991 definitions are essentially the same. Removing the sales criteria allows all resources in the agricultural sector to be measured. Only the Farm Financial Survey modifies the definition to include only those agricultural holdings producing agricultural products which have a gross revenue of at least $2,000.

These data sources also use a common definition of census-farm operator to refer to the person(s) responsible for the day-to-day decisions made in the agricultural operation of a holding. Unlike the U.S. data, Canadian data sources may count more than one operator per farm. Data users are encouraged to consult each data source for differences in definitions and content.

Census of Agriculture

The Census of Agriculture, conducted by Statistics Canada, is the leading source of statistics about the Nation's crop areas and livestock inventories on farms. This census was conducted every 10 years from 1871 to 1951 and every five years since 1951. Because of the rapid expansion of agriculture in the Prairie Provinces (Manitoba, Saskatchewan, and Alberta) starting at the turn of the century, a Census of Agriculture has been conducted there every five years since 1906. Data are published for the Nation, 10 provinces, and over 250 census divisions and are also available on diskettes and public-use computer tapes. The publication program for the 1991 Census of Agriculture is outlined in Statistics Canada (1992a) and a 20-year historical review is presented in Statistics Canada (1992b).

Methodology: The Census of Agriculture is conducted in conjunction with the Census of Population in order to streamline collection procedures and to reduce costs. In recent censuses, including 1991, the census enumerator provides a Census of Population questionnaire to each household and a Census of Agriculture questionnaire to each household that has a member who operates a census-farm. Census questionnaires are mailed back to regional offices for editing and initial processing.

Types of data collected: The Census of Agriculture collects information on acreage, crops and livestock produced, gross farm revenue, cash expenses by item, value of sales, land use, irrigation, type of organization, labor use, and operator characteristics. Most questions refer to conditions as of the day of the census, but information on farm business expenses, hired agricultural labor, sales of agricultural products and off-farm work are reported for the previous year. Beginning in 1991, more than one operator may be designated for each census-farm.

Considerations:

- Starting with the 1991 database, the Census of Agriculture facilitates a better portrayal of the relationship between families and farms. Data users can now tabulate the structural characteristics of more than one family per farm and more than one farm per family.

- Because the census is conducted only once every five years, it may be slow to reflect recent changes in the farm sector.

- Each census enumerates the smallest agriculture holding to obtain an inventory of all agricultural resources and production. However, many small noncommercial holdings do not represent 'farms' to data users or respondents.

- Agricultural products produced under contract complicate the collection of production and expense data. Contracting arrangements vary widely but often the contractor and not the farmer makes most of the production decisions. Since data are usually collected from the operator and not the contractor, data collection and estimation is more difficult.

Agriculture-Population Linkage Database

Files from the Canadian Census of Agriculture are linked to files from the Census of Population to form the Agriculture-Population Linkage Database. As a result, farm household information from the Census of Population, including age, education, and gender of the operator and household members can be linked to farm variables from the Census of Agriculture. This database currently exists for 1971, 1981, 1986, and 1991. Data are available at the National, provincial and sub-provincial levels. Beyrouti et. al (1989) provided a summary of the findings for the 1971 to 1986 period along with an excellent bibliography of earlier studies and data publications. Analysis incorporating the 1986 results have been prepared by Bollman (1991), Bollman and Ehrensaft (1990), Fuller and Bollman (1992), among others. Results from the 1991 Agriculture-Population Linkage are planned for publication in early 1994 (Statistics Canada, forthcoming).

Methodology: Between 1871 and 1951, the Census of Population was taken decennially, but since 1956, it has been conducted quinquennially. This Census consists of a short questionnaire (Form 2A) that collects basic demographic information and is enumerated to the complete population, and a longer questionnaire (Form 2B) that is given to a sample of one-fifth of the households to collect more detailed socio-economic information for each family member (see Statistics Canada 1992c and 1992d for more details).

The same enumerator drops off a Census of Population questionnaire and a Census of Agriculture questionnaire at the same household on the same day. The enumerator writes the household number on the agricultural questionnaire and the farm number on the population questionnaire which facilitates a computer match after each database is edited and imputed. The database of interest is the Census of Agriculture match to the one-fifth sample of the Census of Population. Each

record on the one-fifth sample Agriculture-Population Linkage database is assigned a weight so that it replicates the known control totals.

Types of data collected: This database comprises all variables collected on the Census of Agriculture, and the variables from the one-fifth sample of the Census of Population. The latter group of variables includes age, gender, marital status, industry and occupation of major job, education and training programs completed, place of work, and income by source for each family member.

Considerations:

- A major asset of this database is the ability to analyze the characteristics of the farming operation in relation to the socioeconomic characteristics of farm operators, their spouses, and their families.

- No further editing or imputation is undertaken after the database is constructed, resulting in some data inconsistencies between the two sources.

- The 20-percent sample is large enough for most research purposes, but is not sufficiently large to allow tabulations for census-divisions with a small number of census-farms. Census-divisions have been combined to form weighting areas for sub-provincial tabulations.

- The database contains information on the characteristics of the family of the census-farm operator, although the person designated as the operator of the census-farm may be a foreman or hired manager.

- Net farm income taken from the Census of Population is conceptually unincorporated net farm income, after depreciation. However, a large share of census-farm operators who have only hobby levels of expenses and receipts report zero net farm income. These small farmers do not consider themselves to be operating a farm business and do not report positive or negative net farm income for income tax purposes.

- Wages and salaries are reported as a single item, regardless of the source. Thus, distinctions cannot be made between wages and salaries received from work on the farm and off-farm earnings.

- See other considerations under the Census of Agriculture.

Census of Agriculture Match, 1966-1991

The Census of Agriculture provides the sampling frame for Statistics Canada's intercensal survey program. To update the sampling frame after each census, a name-and-address micro match is performed to remove duplicate records on the central farm register 2/. A by-product is a census-to-census micro-record linkage of Census of Agriculture questionnaires. This file allows the analysis of farm operator entry and exit and changes in size of continuing farms over time. This information is not available from cross-sectional data. Information from this data base is not published as standard output, but is available at cost by special request from Statistics Canada. Research results have been reported by Bollman (1981, 1983), Bollman and Steeves (1982), Kapitany and Bollman (1983), Ehrensaft et al (1984), Shapiro et al (1987) and Bollman and Ehrensaft (1990).

Methodology: A pure farm-to-farm match is not feasible, nor is a pure operator-to-operator match. However, the methodology to update the central farm register is essentially a name-and-address micro match of census-farm operators. See Freeman (1983) for more details on methodology.

Type of data collected: All variables on each Census of Agriculture from 1966 to 1991 are available. Variables from the 1981, 1986, and 1991 Agriculture-Population Linkage Database are expected to be added to the data base in the near future. A census-farm operator who is on the file in one census period but not in another may be classified as an 'exiter' or 'entrant', thus allowing analysis of farm operator mobility.

Considerations:

- The unique matching of name and address enables a longitudinal analysis of change in farm operations over time and allows assessment of farm operator entry and exit.

- The name and address match is not exact, and reporting errors will also introduce data inconsistencies over time.

- The data source includes detailed information on farm structure, production, and finance, but contains no data on farm household characteristics at present.

- See considerations described under the Census of Agriculture

Farm Financial Survey

During the farm financial crisis in late 1970's and early 1980's, the lack of data on the distribution of farm businesses by level of farm financial stress and the distribution of farm families by level of farm family financial stress led the Farm Credit Corporation (FCC) and Agriculture Canada to fund a periodic farm survey, known as the FCC Farm Survey. This survey is conducted annually or biennially and is designed to collect financial data on Canadian farms. Now called the Farm Financial Survey, this survey is sponsored jointly by Statistics Canada and Agriculture Canada. Continuation of data collection beyond 1993 is dependent on available funding and need for data. Data are available for the Nation and provinces. Results have been published by the Farm Credit Corporation (1984, 1988, 1990, and 1992).

Methodology: The sample is a stratified random sample of around 8,500 farms drawn from the central register of farms, which is based on the most recent Census of Agriculture. Agricultural holdings with reported agricultural sales of less than $2,000 are not included in the survey. Institutional farms, farms on Indian reserves, community pastures, farms in areas having little or no agricultural activity, and farms with multiple operations were also excluded from the survey. The sample was stratified by predominant enterprise type and total asset value, and sample results were weighted to represent about 240,000 farms.

Types of data collected: The Farm Financial Survey provides information on financial assets and liabilities, gross farm revenue, farm operating expenses, off-farm income of all family members, and acres owned, rented, and rented from others. Much of the income and expense data are collected in broad aggregates rather than summed from components.

Considerations:

- FFS data are collected more frequently (annually or biennially) than Census of Agriculture-based data sources. These more timely data are able to capture recent changes in the financial status of the farm sector.
- Survey data include only census-farms that are not part of a multi-holding operation and which have gross revenue of at least $2,000.
- The sample size is not large enough to provide statistically reliable estimates below the province level, except in certain circumstances.

The Whole Farm Data Base

The Whole Farm Data Base (WFDB) exists largely because analysts in Agriculture Canada required and were able to obtain funding for annual detailed information on cost structures by size and type of farm. In addition, analysts within Statistics Canada were not satisfied with the former omnibus National Farm Survey for obtaining information on various variables. The result was a joint initiative to develop the Whole Farm Data Base. Data are compiled annually and are available by province and for some sub-provincial regions. Foley and Spooner (1992) have documented the structure and variables on the data base. Selected tabulations are published in Statistics Canada (1993).

Methodology: The WFDB is comprised of data taken from a set of specialized surveys, including taxfiler records, the Farm Financial Survey, and various surveys on crop acreages and yields, and livestock inventories. These data can be tabulated according to common classification variables such as size and type of farm and the data can be 'overlaid' into a cell of common farms. In the future, it will be possible to draw a sample of taxfiler records for the same farms included in the FFS or the commodity surveys. This will allow costs and returns information from taxfiler records to be matched with farm structure, commodity, and finance variables from other surveys for the same farm. In addition, taxfiler records could, in the future, be linked to Census of Agriculture records at the micro level.

Type of data collected: Taxation records provide cash receipts and cash expenses by item. The Farm Financial Survey provides information on assets and debts by type of farm. Various agricultural production surveys provide data on acreage and yield of crops and livestock inventories.

Considerations:

- The WFDB utilizes information from several different surveys to offer detailed and comprehensive farm data on an annual basis.

- Not all farms are included on all data sets. The Farm Financial Survey applies only to census-farms with gross revenue of $2,000 or more. Taxfiler data are generally provided for farms with gross revenue of $10,000 and over, although some data can be tabulated for taxfilers with gross revenue under $10,000. Commodity survey data generally apply to all census farms.

- The prevailing tenet of one farm, one business, one family is severely tested with the design of the WFDB. Businesses may operate more than one farm,

farms may operate more than one business, and farms may have more than one family. Difficulties arise in matching separate taxation data for individuals and corporations with surveys that search for a census-farm. Cases for one business-one farm are easy, but methods to deal with other scenarios need to be developed. The Farm Financial Survey is enumerated for census-farms but asks for data on business units; most respondents combine their business records to reflect one unit, even if they operate several farms.

- Taxfiler data provide information on the off-farm income of the taxfiler and the off-farm income of the family, but only for families with an unincorporated farm taxfiler. Taxfilers associated with a corporate farm cannot be identified and the off-farm income of their families can not be determined.

POINTS OF COMPARISON

Several broad similarities exist between farm structure data sources in Canada and the United States. Both countries conduct a census of agriculture every five years to gather benchmark information on farming and agricultural production. Each country conducts an additional survey of farm finances on a more timely basis (annually for the U.S. Farm Costs and Returns Survey and annually or biennially for the Canadian Farm Financial Survey). Both countries have developed longitudinal files that link several years of census data to enable analysis of change in individual farm operations over time and allow assessment of farm operator entry and exit.

The content of farm structure data sources is similar in both the United States and Canada; common agricultural patterns and trends have resulted in common variables and measures. For example, type of farm is determined consistently in both countries by the commodity group that accounted for 50 percent or more of the farm's total value of sales of agricultural production. In both countries, land in farms (whether measured in acres or hectares) consists of agricultural land used for crops, pasture, or grazing and includes woodland and wasteland if part of the farm operator's total operations.

However, fundamental differences exist as well. Comparisons of farm structure data between the United States and Canada are affected by differences in definitions, concepts, and measurement; data collection methodologies; and access to data. In addition, the fluctuation in exchange rates between the United States and Canada complicates financial comparisons.

Definitions, concepts, and measurement

A critical difference between U.S. and Canadian data sources focuses on the definition of a farm. U.S. sources define farm as any place from which $1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year. Canadian data sources define farm as any place which produces agricultural products for sale. As a result of these definitional differences, Canadian data sources include some small "farms" that would not be encompassed in U.S. data. Data from the 1991 Canadian Census of Agriculture suggest that 12,000 farms or 4 percent of all farms in Canada had sales of less than US$1,000.3/ Most Canadian agricultural data can be adjusted to the U.S. equivalent of $1,000 in sales although the U.S. data cannot be adjusted to match the more inclusive Canadian data. The Canadian exception is the Farm Financial

Survey which collects information only on farms with value of sales of at least $2,000.

U.S. and Canadian data sources differ in their definitions of farm operators. U.S. sources assign only one operator per farm. Prior to 1991, the Canadian Census of Agriculture also identified only one operator per census-farm--the person who was responsible for the day-to-day decisions made in the operation of the farm. However, starting in 1991, the Canadian Census of Agriculture lists all persons responsible for the day-to-day decisions made in the operation of the farm. The Canadian Farm Financial Survey, previously known as the Canadian Farm Credit Corporation Farm Survey, has asked for the total number of operators associated with holdings since 1984.

Linkages among sources of data

Data collection techniques commonly used in Canada allow linkage of many sources of agricultural data. Individual files from the Census of Agriculture are matched through a common identification number to files from the Census of Population in the Agriculture-Population Linkage database. As a result, demographic variables from the Census of Population can be linked to farm variables from the Census of Agriculture. Canada is also in the process of linking the sample of taxfiler records to the Farm Financial Survey and various commodity surveys so that costs and returns information from taxfiler records can be cross-tabulated with variables from other surveys for the same farm. In the future, taxfiler records may be linked to Census of Agriculture records at the micro level. Comparable linkages among the U.S. sources of data have not been accomplished.

Data access

Canadian farm structure data sources may be more accessible to data users than sources in the United States. All five major sources of Canadian data are sponsored by Statistics Canada, some in conjunction with Agriculture Canada, and data access can be obtained through one agency. U.S. data sources are sponsored by different Federal agencies and departments within those agencies, and U.S. data users may have to contact several individual agencies to obtain information. Also, because of the smaller number of Canadian farms and perhaps more efficient data maintenance procedures, special tabulations of Canadian data appear to be more rapid and are relatively less costly than in the United States.

Exchange rates

The exchange rate between the United States and Canada affects comparisons of farm financial data. For example, in 1991, the average exchange rate was 1.166, meaning that one U.S. dollar was worth 1.17 Canadian dollars. Financial measures such as value of gross sales, cash receipts, and farm and nonfarm income, among others, should be converted to either U.S. or Canadian dollars for comparison purposes. At the same time, fluctuations in the exchange rates over time complicate historical farm financial analyses. For example, the average U.S.-Canadian exchange rate in 1986 was 1.366 compared to 1.166 in 1991. Large fluctuations in the exchange rate raise questions about whether changing trends represent actual change or financial speculation.

DATA COLLECTION ISSUES FOR THE FUTURE

This review of U.S. and Canadian sources of farm structure data highlights the strengths and weaknesses of data collection in our respective countries. The review also suggests future data collection issues to be pondered by analysts and data users in both the United States and Canada.

One of the greatest strengths of the Canadian farm structure data is the ability to link individual household data from different data sources. This linkage provides extensive details on demographic, family, economic, and agricultural conditions which are not feasible to collect in any one survey. U.S. efforts in this direction could help strengthen and improve the quality and quantity of agricultural data in this country. But, this linkage will be more difficult to achieve in the United States because of the relatively larger number of farms.

The 1986 Canadian Census of Agriculture reported 293,000 census-farms compared to the 2,088,000 farms reported by the 1987 U.S. Census of Agriculture. Also, all of Canada's major data sources are located in one centralized distribution center which facilitates data linkage, while U.S. data sources are spread among different Federal agencies. Finally, privacy issues in both the United States and Canada complicate the merging of data sets based on common identification numbers. However, Canada has had some success in linking households among different data sets and is exploring options to expand linkages to additional sources of data.

Comparisons of Canadian and U.S. data sources raise questions about "what is a farm?" Farming is changing and the historical concept of one farm, one operator, one family, one business may no longer be valid. Canadian data sources recognize this possibility and collect information on all operators and all families on the farm. However, even in these data sources, farm definitions are not clear cut. For example, an arrangement where three family members each have a farm but all work together and share machinery raises questions as to how many farms should be counted. In contrast, U.S. data sources avoid definitional problems created by these non-traditional arrangements and simply count one operator and one household per farm. In doing so, however, U.S. data sources are missing valuable information on farm operators.

Some researchers in the United States have argued for raising the farm sales criteria above $1,000 to reduce the number of marginal or hobby farms included in the census data. Under the present definition, a nonfarm household selling animals from a 4-H project or garden produce at a roadside stand could qualify as a farm. In many cases, these "enterprises" are so small that they do not appear as farms on any agricultural-related source list used for sampling or census-taking, making enumeration difficult. In contrast, Canada has recently moved in the opposite direction to make the definition of a farm more inclusive.

In 1981 and 1986, a Canadian census-farm was defined as a farm, ranch or other agricultural holding with sales of agricultural products during the past 12 months of $250 or more, or which anticipated sales of $250 or more during the census year. In 1991, Canada eliminated value of sales as a criteria to define census-farms in order to include all the resources in the agricultural sector. It may be that this more inclusive definition supports the idea that data collectors should collect and data analysts should analyze, leaving decisions about what constitutes a farm to individual researchers.

This data source review has also led us to consider neglected directions and missed opportunities. U.S. data sources, in particular, are remiss for not extending the definition of farm operator to include all partners who make farm decisions, and for collecting relatively little information on farm operators and their families. Canadian data sources have not fully explored the increasing importance of landowners who receive income from their holdings. This becomes analytically important as benefits of government programs become capitalized into land values. The present inquiry in Canada into methods of paying the 'Crow' benefits to farmers is partly a discussion of whether the farmer or the landlord should receive the compensation 4/. There is little information in Canada on characteristics of who owns Canadian farmland. While landowners have received increased attention in U.S. data

collection efforts such as the Agricultural Economics and Land Ownership Survey, similar efforts have not been undertaken in Canada.

Both U.S. and Canadian data users may wish to consider net value-added measures as an alternative to gross sales for examining change in farm size and structure. Net value-added indicators measure the share of net output that remains in the farm sector to reward all persons who have committed land, labor, capital, or management skills to these business (Stanton et al. 1992). Value-added measures are likely to be more appropriate for making relevant comparisons across different types of farming. However, questions about the best methods for measuring value-added remain unresolved and these measures may require more detailed farm financial data than is currently available from most Canadian and U.S. data sources.

Finally, we add a note on the effects of future budgets constraints. In the United States, Federal resources for agricultural statistics programs are unlikely to increase in the near future. Many government agencies are currently facing budget reductions and must control costs. Cost-cutting measures may result in the modification, reduction, or elimination of existing farm structure data. In Canada, a substantial share of the collection of farm structure data is now part of the Whole Farm Data Project, funded by Agriculture Canada. Funding has been justified on the basis of monitoring and evaluating the new safety net programs. Should these safety net programs change or decline in importance, data priorities may change affecting the content, timing, and magnitude of current data sources.

Footnotes

1. The June Agricultural Survey does not report any information on farm operators.

2. The central farm register is based on the Census of Agriculture and is updated between censuses to provide the sampling frame for regular Statistics Canada surveys of farmers.

3. However, a portion of these would have had 'anticipated' sales over $1,000 (for example, farm businesses that had just started in recent months).

4. The 'Crow Benefit' refers to the subsidy for transporting grain by rail that was signed as part of the 'Crow's Nest Pass Agreement' early in the century. The benefit of a grain transportation subsidy would be expected to be capitalized into the price of farmland, given that the quantity of Canadian grain has little impact on world prices. See Western Producer (1993) for a review of the present debate over the 'Crow Benefit'.

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Table 1. Major U.S. and Canadian data sources: Types of data collected

Data Source	Basic farm structure variables: Number of farms	Size of farms	Farm type	Type of farm A/	Economic organization B/	Other data collected: sales class
U.S. DATA						
Census of Agriculture	X	X	X	X	X	--Financial performance indicators --Production data --Operator characteristics
Census of Agriculture Longitudinal File	X	X	X	X	X	--Operator characteristics
Agricultural Economics and Land Ownership Survey	X	X	X	X	X	--Financial performance indicators --Operator characteristics --Landlord characteristics
Farm Costs and Returns Survey	X	X	X	X	X	--Financial performance indicators --Production data --Operator characteristics --Farm household attributes
June Agricultural Survey	X	X			X	
CANADIAN DATA						
Census of Agriculture	X	X	X	X	X	--Financial performance indicators --Production data --Operator characteristics
Census of Agriculture-Population Linkage Database	X	X	X	X	X	--Financial performance indicators --Production data --Operator characteristics --Farm household attributes
Census of Agriculture Match, 1966-91	X	X	X	X	X	--Financial performance indicators --Production data --Operator characteristics
Farm Financial Survey	X	X	X	X	X	--Financial performance indicators --Production data --Operator characteristics --Farm household attributes
Whole Farm Data Base	X	X	X	X	X	--Financial performance indicators --Production data --Operator characteristics --Farm household attributes

A: Based on major commodity produced.

B: Defines farms by type of ownership, for example, individual or family owned, partnership, or family or non-family held corporation.

Table 2. Major U.S. and Canadian data sources: General Characteristics

Data Source	Responsible agency	Frequency of data collection	Level of greatest geographic detail available	Most recent data	Longitudinal or Cross-Sectional data
U.S. DATA					
Census of Agriculture	Bureau of Census	5 years	County	1987	Cross-sectional
Census of Agriculture Longitudinal file	Bureau of Census	5 years	County	1987	Longitudinal
Agricultural Economics and Land Ownership	Bureau of Census	5 years A/	State	1988	Cross-sectional
Farm Costs and Returns	USDA,ERS/ NASS B/	Annual	Region	1991	Cross-sectional Survey
June Agricultural Survey	USDA, NASS	Annual	State	1993	Cross-sectional
CANADIAN DATA					
Census of Agriculture	Statistics Canada	5 years	Census sub-division C/	1991	Cross-sectional
Census of Population	Statistics Canada	5 years	Census sub-division C/	1991	Cross-sectional
Census of Agriculture-Population Linkage Database	Statistics Canada	5 years	County groups	1991	Cross-sectional
Census of Agriculture Match, 1966-91	Statistics Canada	5 years	Census sub-division C/	1991	Longitudinal-
Farm Financial Survey	Statistics Canada/ Agriculture Canada	Annual or biennial D/	Provinces E/	1992	Cross-sectional
Whole Farm Data Base	Statistics Canada/ Agriculture Canada	Annual	Census agricultural regions F/	1991	Cross-sectional

A/ Farm financial data have been collected in AELOS and its predecessors every 5 years since 1964.
B/ U.S. Department of Agriculture, National Agricultural Statistics Service and Economic Research Service.
C/ Refers to townships and rural municipalities.
D/ Timing of data collection depends on funding and data needs.
E/ Some sub-provincial information may be tabulated depending on sample size.
F/ Census agricultural regions are groupings of census divisions.

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